

EPA Flint Drinking Water Technical Support Team
Status of System Recovery
March 10, 2017

In October 2015, EPA established the Flint Safe Drinking Water Task Force (now called the Flint Drinking Water Technical Support Team) to provide Agency's technical assistance to Michigan Department of Environmental Quality (MDEQ) and the City of Flint. Since then, EPA has worked with the City of Flint and MDEQ to gather information to assess the state of the system. More information is on EPA's website at <https://www.epa.gov/flint/flint-safe-drinking-water-task-force>

This document is a summary of the current state of the system recovery based on data collected by EPA, MDEQ and other organizations and discussed during a series of data summits. Presentations from the most recent data summit are on EPA's website at <https://www.epa.gov/flint/third-flint-data-summit-presentations>

Current State of System Recovery

In October 2015, the City of Flint stopped using Flint River water and switched back to purchasing finished water from the Great Lakes Water Authority. Switching back to GLWA finished water has resulted in a significant improvement in the quality and stability of the water coming into the Flint system. In addition to the orthophosphate already present in water received from GLWA, the level of orthophosphate used for corrosion control was increased significantly at the Flint Water Treatment Plant. The increase in orthophosphate accelerated re-establishment of the protective coatings in the water mains, service pipes and premise plumbing.

Through the combined efforts of EPA, MDEQ and the City of Flint, significant improvements have been achieved in all water quality areas:

- Ability to maintain an adequate disinfection barrier throughout the system
- Significant decrease in lead levels overall
- Disinfection byproducts well below Maximum Contaminant Levels (MCLs)
- Absence of discolored water

More detail about efforts undertaken and the current status are provided below.

Disinfection Barrier/Microbial Protection

Maintaining adequate chlorine residual throughout the distribution system is essential for maintaining microbial protection. During 2016, EPA worked with the City of Flint to establish representative locations for monitoring chlorine residual levels within the distribution system. EPA added 24 additional chlorine monitoring sites to the 10 sites monitored by the City of Flint, for a total of 34 locations, which were monitored weekly. Additional monitoring sites consisted primarily of churches, schools and childcares in close proximity to neighborhoods. The additional monitoring sites were identified and monitored by EPA to assess and ensure the effectiveness of the disinfection barrier.

The Flint distribution system was designed to serve a much larger population than it is currently serving. Consequently, water age and water quality were not consistent across the system. EPA worked with the City of Flint to implement best management practices to, among other things, address localized areas with low chlorine residuals by installing automated and manual flushers and closely monitoring these areas. Additional chlorination capabilities were also added to the system. These additions were necessary to increase chlorine residuals and maintain a disinfection barrier within the distribution system. The disinfection barrier is an important component of the multi-barrier approach to water treatment. These efforts have resulted in significant improvement in the ability to maintain a best management practice chlorine residual of 0.2 mg/L and greater throughout the water distribution system.

Beginning in 2017, the City of Flint updated their Revised Total Coliform Rule (RTCR) monitoring to include monitoring chlorine residuals weekly in 35 samples from a total of 25 locations. This updated monitoring program supplants the monitoring of the 24 sites that was conducted by EPA in 2016.

The City of Flint is currently undertaking additional measures to assess and optimize distribution system operations, including repairing water main valves, utilizing hydraulic modeling and other evaluation activities. This will further improve the City's ability to maintain adequate microbial protection. It is expected that these efforts will likely necessitate significant investment in infrastructure improvements.

Lead Levels

EPA conducted sequential sampling from January through November 2016 for metals, pH, phosphorus, chlorine and Coliform bacteria where low/no chlorine was detected. Lead levels have decreased significantly overall. Removal of the lead service lines has been the most significant factor contributing to lead reduction at individual homes. However, the incidence of high lead levels has also decreased across the system (89 percent and 65 percent decrease in lead levels above 15 ppb from January 2016 to September 2016 and January 2016 to November 2016, respectively), indicative of improved stability in the system due to the reformation of the orthophosphate-containing scale on the pipes. The capacity to adjust pH was also added to the system to account for seasonal pH fluctuations which can affect the effectiveness of the corrosion control treatment.

While the corrosion control treatment has significantly reduced lead levels on a system-wide basis, there are factors which can cause high lead release on a site-by-site basis despite effective treatment and a stable water quality. There are also site-specific conditions which can negate or partially negate the effectiveness of the treatment. The primary contributing factors to high lead levels at individual residences are the lead service lines and associated galvanized iron pipe. These situations are more likely to be subject to random disturbances that can result in scale particulate release which has a high concentration of lead. Consequently, high lead levels are still possible at homes that still have lead service lines. Residents with lead service lines should continue to use point-of-use filters which are certified to remove lead. It is important to note that the presence of lead service lines and the potential for scale release is not unique to Flint;

however, with the aggressive lead service line replacement program and other construction on the system, out of an abundance of caution, EPA is recommending continued filter use for residents until their lead service line and any associated galvanized iron pipes have been replaced or until it is verified that no lead service line or associated galvanized iron line are present at their individual property. In addition to the reduction in lead levels, the switch to GLWA and increased orthophosphate dosage has effectively eliminated the severe discoloration of the water caused by high iron levels leaching from the water mains.

Four pipe loop rigs have also been delivered and installed by EPA and are operating at the Flint Water Treatment Plant. These pipe loop rigs have been put in place for assessing water treatment changes, water quality changes, and source water changes. These pipe loop rigs can also be used to evaluate and optimize corrosion control strategies, identify and prevent unintended consequences from water source or treatment changes, and identify the form of metal release (soluble vs particle).

Disinfection Byproduct Formation

The City of Flint incurred multiple violations for exceeding the regulatory limits for disinfection byproducts due to a number of factors, including the switch to the Flint River as a source which has more byproduct precursors, i.e., organic material, than the Great Lakes source water. This problem was remedied with the City of Flint's installation of granular activated carbon to remove organic material from the water and ultimately with the switch back to GLWA water. To assess disinfection byproduct levels throughout the distribution system, EPA conducted extensive monitoring in 2016 for total trihalomethanes (TTHM) and five haloacetic acids (HAA5). During 2016, a total of 24 sets (TTHM and HAA5) of samples were collected each month from March through December. The average monthly TTHM values ranged from 14.9 to 41.3 ppb and the average monthly HAA5 values ranged from 11.8 to 26.0 ppb. All results were consistently well below the regulatory limits for TTHM (80 ppb) and HAA5 (60 ppb).